

2010 Oral Presentation Scenario
PROTECTION OF GROUNDWATER
THROUGH URBAN, AGRICULTURAL, AND ENVIRONMENTAL PLANNING

A town in southwestern Louisiana lies on the edge of a rice field. Excessive levels of nitrate above the safe drinking water standard of 10mg/liter have been found in one of the town's two public water supply wells. The economy of the town is heavily reliant upon rice farming and milling of the rice and to a lesser extent on oil production from a few wells. Crawfish farming is also done. Babies under 6 months of age are at risk for a potentially fatal blood disorder call "blue baby syndrome" with the excessive nitrate.

The soils in the area are primarily river sands with interspersed clays. There is a relatively thin clay layer at the surface which is about 5 feet in thickness underlain by a 100 foot thick sand. The sand is very permeable with high water yields. Groundwater is found at the top of the sand and the town wells are drawing water at about 60 feet. The driving force for groundwater flow is the pumping of the town's wells although on seasonal basis two irrigation wells a few hundred feet away also draw large amounts of water out of the same aquifer. It is currently irrigation season.

There is no extensive forest land in an area that consists of relatively flat open farmland. There is a nearby stream that runs through the town and along the edge of the adjacent farmland. There is however a row of trees along both sides of the stream. In addition to rice fields and crawfish farming there are barnyards on the farms.

Recent technology has helped farmers to change from a traditional water seeded system to a drill-seeded system which conserves water. The essential components of a successful nitrogen fertilizer management plan are consideration of the source of the nitrogen fertilizer, the placement of the fertilizer in the field, the application rate to meet crop needs, and timing. There is additional concern about nearby oil drilling, also a part of the local economy, in that the wells penetrate the drinking water aquifer while reaching a deeper oil producing sand. The groundwater is used in oil drilling too and beyond that there is the potential for aquifer contamination which could affect both urban and agricultural users of the aquifer.

It can be difficult to remove nitrates from drinking water. Assume that the only long term option in this case would be to drill a new well to meet drinking water demand. It is important that the town consider urban potential sources of contamination in addition to agriculture when choosing the new drinking water well location.

The Town Council has hired your team to provide them with investigative approaches as well as specific solutions to the agricultural nitrate pollution problem and urban problems as they relate to the protection of groundwater. Your presentation will be given to the Council to help resolve the problem. Below are some of the issues the council is interested in.

1. What is the immediate risk to the public due to a lack of effective environmental planning? What United States Environmental Protection Agency regulation was violated?
2. What are some of the dangers of placing the irrigation wells so close to the public supply wells or vice versa?

3. Since it is irrigation season, how do public officials determine priority use among those drawing from the aquifer when allocating the limited water supply? List the major water users in order and why you think that order should be chosen.
4. What are the inherent dangers of water flooding of rice fields as it relates to shallow drinking water aquifers?
5. The Louisiana Department of Natural Resources (LDNR) regulates the drilling of oil wells. What do you think would be an appropriate drinking water protection measure when drilling to avoid contamination of the aquifer from nearby oil drilling? LDNR refers to such water as an underground source of drinking water or USDW.
6. What factors would you take into consideration regarding the drilling of the replacement municipal well?
7. What are some of the harmful ways that urbanization can affect the farmer?
8. How does the contaminated shallow aquifer potentially affect the nearby stream? Explain the potential interaction between the stream and the groundwater in the aquifer. What role could the trees play in stream protection?
9. How are soils, forestry, and aquatics involved in the current issue scenario?
10. What are the potential social/economic affects on the town, businesses, and the people as a result of this episode?
11. What do you think are some specific potential causes of the drinking water aquifer nitrate contamination that need investigation?
12. In the process of developing proper investigation into the current environmental problem, prepare a visual aid to clarify your ideas and cite references such as Whom, Where, and When if needed to re-enforce some of your conclusions.
13. How can public officials address future threats to surface and groundwater sources? Develop a plan, the cost of implementing the plan, the economic impact on local resources, cost of doing nothing, future costs, and funding sources.